Maternal Mortality
Partnering to Reestablish Maternal Mortality Review
Maternal Mortality Crisis in Georgia

• In 2010 Amnesty International “Deadly Delivery: The Maternal Health Crisis in the U.S.A.”
• Georgia ranked 50th in maternal mortality
• Georgia maternal mortality ratio:
  o 2001-2008: 24.8 / 100,000 live births
  o 2012: 23.2
Step 1: Establishing a Maternal Mortality Advisory Committee

• Emory Gynecology & Obstetrics
• Georgia Obstetrical/Gynecological Society
• Georgia Department of Public Health
Step 2: Determining Methodology for Case Identification

- Death certificates for ages 10-50 matched to birth or fetal death certificate
- Pregnancy check-box on the death certificate
- Maternal death mandated reporting
- Death certificate with pregnancy-associated cause of death
Step 3: Meeting of the Maternal Mortality Review Committee

- Introductory meeting September 2012
- Multidisciplinary, volunteer members
- Introductory forum for members
- Orienting members about the goals and methodology for case review
Step 4: Securing Legislative Protection for Case Review

- Senate bill 273 (2013-14)
- Legislation became effective July 1, 2014
  - Established protection for committee members and the review process
  - Strengthened authority for Public Health to obtain records needed for maternal mortality case review
Step 5: Pilot the MMRC Case Review Process

- November 2012 meeting
- Abstractor provided five case summaries for review
- Cases reviewed to determine:
  - Pregnancy-related
  - Pregnancy-associated, not related
Step 6: 2012 Maternal Mortality Report

• First report published in June 2015
• Included determinations and recommendations for 85 maternal deaths from 2012

Maternal Mortality

2012-2014 Surveillance in Georgia

Maternal Mortality Study Committee / J. Michael Bryan, MPH, PhD / Sept. 13, 2019
Background

Nationally, pregnancy-related deaths have steadily increased from 7.2 deaths per 100,000 live births in 1987 to 18.0 deaths per 100,000 live births in 2014

- Approximately 700 women die each year as a result of pregnancy or pregnancy-related complications
- Black, non-Hispanic women are 3-4 times more likely to experience a pregnancy-related death than White, non-Hispanic women
A maternal death is the death of a woman while pregnant or within one year of end of pregnancy. All maternal deaths are pregnancy-associated.

- Pregnancy-related: The death of a woman while pregnant or within one year of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management.
- Pregnancy-associated, not related: The death of a woman while pregnant or within one year of the end of pregnancy, due to a cause unrelated to pregnancy.
- Pregnancy-associated but unable to determine pregnancy-relatedness.
Sources of Maternal Mortality Information

National
• National Center for Health Statistics (NCHS)
  o During pregnancy – 42 days postpartum
• Pregnancy Mortality Surveillance System (PMSS)
  o During pregnancy – <365 days postpartum

Georgia
• Online Analytical Statistical Information System (OASIS)
  o During pregnancy – <365 days postpartum
• Maternal Mortality Review Information App (MMRIA)*
  o During pregnancy – <365 days postpartum

The various data sources differ in purpose, methodology, measures, etc.

*Gold standard
Case Identification

1. Notifiable condition report
2. Pregnancy checkbox on the death certificate
3. ICD-10 “O codes”
4. Death certificate linked to birth or fetal death certificate
5. Search of obituaries and news outlets
Pregnancy Checkbox

• “Pregnancy checkbox” on the death certificate
• Typically completed by coroners, medical examiners or physicians
• Electronic form
  o For a female ages 10-54 this field is required
  o If the deceased is not female then the field will default to “Not Applicable” and is locked
• Hard copy form
  o The certifier of the death will check a box on the form
  o The data from the paper form will then be input into the electronic system by a county vital records clerk (which follows the rules above for electronic data entry)
### Pregnancy “Checkbox”

#### Electronic form

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT PREGNANT WITHIN THE PAST YEAR</td>
</tr>
<tr>
<td>PREGNANT AT TIME OF DEATH</td>
</tr>
<tr>
<td>NOT PREGNANT, BUT PREGNANT WITHIN 42 DAYS OF DEATH</td>
</tr>
<tr>
<td>NOT PREGNANT, BUT PREGNANT 43 DAYS TO ONE YEAR BEFORE DEATH</td>
</tr>
<tr>
<td>NOT APPLICABLE</td>
</tr>
<tr>
<td>UNKNOWN IF PREGNANT WITHIN THE PAST YEAR</td>
</tr>
</tbody>
</table>

#### Paper form

17. IF FEMALE
- Not pregnant but pregnant within 42 days of death
- Not Pregnant, but pregnant 43 days to 1 year before death
- Unknown if pregnant within the past year
- Not Pregnant within past year
- Pregnant at time of death
- Not applicable
Linkage - Deterministic

• Compares the group of identifiers (name, date of birth, SSN, etc.) for the decedent (death certificate) and the mother’s information on the birth/fetal death certificate
• A link is made if they all agree
Linkage - Probabilistic

- Similarly, compares the group of identifiers (name, date of birth, SSN, etc.) for the decedent (death certificate) and the mother’s information on the birth/fetal death certificate
- The probabilistic linkage accounts for data entry errors or inconsistencies in the records
- The probabilistic record-linking method calculates the probability that two records belong to the same person
- A manual review is conducted of records that surpass the ~70% threshold
Opportunities

Enhance case identification

• Implement quality assurance measures to improve the pregnancy checkbox
• Provide technical assistance to mandated reporters to improve notifiable disease reporting

Improve information gathering

• Include data on socio-spatial context in reviews
• Integrate other Public Health data sources (Cancer Registry, Georgia Violent Death Reporting System, etc.)
Questions?
Maternal Mortality
Abstraction and Review

Maternal Mortality Study Committee / Chris Tice, Maternal Mortality Lead Abstractor/Sept. 19, 2019
Reports and Records Needed for Case Abstraction

- Autopsy
- Prenatal care
- Emergency room visits
- Hospitalizations
- Medical transport
- Informant interviews
- Public health
- Medical examiner report and investigation

- Subspecialty consults and visits (Cardiology, Hematology, Pulmonology, Oncology, etc.)
- Psychiatry / mental health care
- Law enforcement records (GBI, sheriff, state police)
- Coroner report and investigation
- DFCS – report and investigation
Case abstraction

• Background/skills needed to be an abstractor
  o Obstetrics background: either RN, APRN or MD
  o Up to date on current practice recommendations

• Determination of records needed for each individual case
  o Critical thought process based on Cause of Death codes and hospitalizations

• CDC training that each abstractor must attend
  o Yearly educational updates on the abstraction process and information-sharing on best practices
Case Abstraction

• Cases identified by DPH Epidemiology staff
• Abstractors and epidemiologists work collaboratively to remove non-cases
  o Any woman > 55 years old, or < 10 years old is removed
  o Any woman who was not a resident of Georgia
• All remaining cases are fully abstracted
  o All cases including regardless of cause of death are abstracted up to 365 after the end of pregnancy
  o One case takes an average of 20 hours after of the medical records are received but depending on complexity of the case can take longer
Maternal Mortality Case Review (MMRC)

- Case summaries
- Quarterly meetings
  - Confidentiality agreement obtained at each meeting
  - Facilitated discussion of case findings
  - Committee decision form completed
    - 6 Key Questions
- Data entry into CDC database
Next Steps:

Abstract and review all maternal deaths within 2 years of occurrence of death:

• Increase the number of abstractors reviewing records
• Increase the frequency of MMRC meetings
• Complete 2016 and 2017 case abstraction and review in 2020
• Complete 2018 and 2019 case abstraction and review in 2021
Questions?
Maternal Mortality

2012-2014 Review Findings

Maternal Mortality Study Committee / J. Michael Bryan, MPH, PhD / Sept. 19, 2019
Case Review by the MMRC

MMRCs make six key decisions for each death reviewed:

1. Was the death pregnancy-related?
2. What was the cause of death?
3. Was the death preventable?
4. What were the factors that contributed to this death?
5. What are the recommendations and actions that address these contributing factors?
6. What is the anticipated impact of these actions if implemented?
Maternal Mortality Review, 2012-2014

250 maternal deaths reviewed

101 (40%) of maternal deaths were determined to be pregnancy-related deaths

62 (~60%) of the pregnancy-related deaths were deemed preventable
Pregnancy-Related Maternal Mortality Ratio

**U.S. 17.0** pregnancy-related deaths per 100,000 live births (2012-2014)
  - Centers for Disease Control and Prevention’s Pregnancy Mortality Surveillance System

**Georgia 25.9** pregnancy-related deaths per 100,000 live births (2012-2014)
Pregnancy-related Mortality Ratio by Race, Georgia 2012-2014

White, non-Hispanic: **14.3** deaths per 100,000 live births

Black, non-Hispanic: **47.0** deaths per 100,000 live births
Pregnancy-related Mortality Ratio by Maternal Age, Georgia 2012-2014

- Under 25 years of age: 17.5
- 25-29 years of age: 22.0
- 30-34 years of age: 26.7
- 35+ years of age: 52.2
Leading Causes of Pregnancy-Related Deaths
Georgia 2012-2014

- Cardiovascular and Coronary Conditions: 13 deaths
- Embolism: 10 deaths
- Cardiomyopathy: 16 deaths
- Hemorrhage: 13 deaths
- Preeclampsia and Eclampsia: 9 deaths
- Amniotic Fluid Embolism: 8 deaths
Leading Causes of Pregnancy-Related Deaths by Race
Georgia 2012-2014

<table>
<thead>
<tr>
<th>Condition</th>
<th>White, non-Hispanic</th>
<th>Black, non-Hispanic</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular and Coronary</td>
<td>3</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Coronary Conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embolism</td>
<td>1</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>5</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Preeclampsia and Eclampsia</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Amniotic Fluid Embolism</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
Preventability of Pregnancy-Related Deaths by Leading Causes
Georgia 2012-2014

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage of Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular and Coronary Conditions</td>
<td>69%</td>
</tr>
<tr>
<td>Embolism</td>
<td>60%</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>44%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>85%</td>
</tr>
<tr>
<td>Preeclampsia and Eclampsia</td>
<td>63%</td>
</tr>
<tr>
<td>Amniotic Fluid Embolism</td>
<td>25%</td>
</tr>
</tbody>
</table>
Maternal Deaths by Timing of Death
Georgia 2012-2014

<table>
<thead>
<tr>
<th>Timing of Death</th>
<th>Pregnancy-Associated, Not Related</th>
<th>Pregnancy-Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>While pregnant</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Less than 1 day postpartum</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1 day to 42 days postpartum</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>43 days to 6 months postpartum</td>
<td>46</td>
<td>17</td>
</tr>
<tr>
<td>Greater than 6 months up to 1 year</td>
<td>70</td>
<td>10</td>
</tr>
</tbody>
</table>
Questions?
Georgia Perinatal Quality Collaborative: Putting MMRC Data Into Action

Melissa Kottke, MD, MPH, MBA / GaPQC Maternal Chair / Sept.19, 2019
Georgia Perinatal Quality Collaborative

Vision
Better perinatal outcomes and health equity for every Georgia mother and baby.

Mission
To engage stakeholders in implementing equitable, evidence-based perinatal care through a robust data-driven quality improvement collaborative.
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PQC Model

• ...by advancing evidence-informed clinical practices and processes using quality improvement (QI) principles to address gaps in care. PCQs work with clinical teams, experts and stakeholders, including patients and families, to spread best practices, reduce variation and optimize resources to improve perinatal care and outcomes.

• Quality Improvement
• Data driven
• Collaborative model
• Steal and share
• Sustainability
The Power of Data-Informed, Evidence-Based, Quality Improvement

Maternal Mortality Rate, California and United States; 1999-2013
What Are AIM Bundles?

- AIM = Alliance for Innovation in Maternal Health
- Sets of best practices for maternal care
- Include recommendations for hospital-based protocols, policies, practice changes, drills, and system of data tracking
- Represent national consensus
- Georgia became the 13th AIM state in November 2017
Council on Patient Safety in Women’s Health Care
AIM-SUPPORTED PATIENT SAFETY BUNDLES

- Maternal Venous Thromboembolism Prevention
- Postpartum Care Basics for Maternal Safety From Birth to the Comprehensive Postpartum Visit
- Postpartum Care Basics for Maternal Safety Transition From Maternity to Well-Woman Care
- Obstetric Care for Women with Opioid Use Disorder
- Obstetric Hemorrhage
- Reduction of Peripartum Racial/Ethnic Disparities
- Safe Reduction of Primary Cesarean Birth
- Severe Hypertension in Pregnancy
- Severe Maternal Morbidity Review
- Support After a Severe Maternal Event
More Support for AIM Bundles

Modern Healthcare

Joint Commission imposes maternal safety standards for hospital accreditation

The 13 new standards are in response to widespread adoption of evidence-based practices to prevent maternal mortality due to hemorrhage and hypertension.

Starting next July, the Joint Commission will require accredited hospitals to have 13 policies in place to help prevent the likelihood of hemorrhage and severe hypertension for pregnant patients.
GaPQC History

• GaPQC was established in 2012
• Awarded CDC PQC infrastructure funding fall, 2017
• Some participation goals from our proposal:
  o Year 1: 10 hospitals participate in AIM Hemorrhage Bundle
    – 85% of birth hospitals by Year 5
  o Year 2: 10 hospitals participate in AIM Severe Hypertension Bundle
    – 60% of birthing hospitals by Year 5
Data-Driven Selection of Evidence-Based Bundle
GaPQC Maternal Initiative: Implement AIM Bundles

• Launched OB Hemorrhage April 2018
• Launched Severe Hypertension in Pregnancy in June 2019
• Integrating components of the Reduction of Perinatal Disparities Bundle
Leadership

Michael Bryan, MPH, PhD  
Diane Durrence, APRN, MSN, MPH  
Lynne Hall, RN, BSN  
Melissa Kottke, MD, MPH, MBA  
David Levine, MD, FAAP, FACP  
Lauren Nunally, BSN, RNC-OB, MPH  
Ravi Patel, MD, MSc  
Kaprice Welsh, CNM, MSN, MPH

Committees

Maternal Committee

Chair: Melissa Kottke
Staff: Lauren Nunally, Terrill Flakes
Current Initiatives
- Hemorrhage
- Hypertension

Neonatal Committee

Chair: David Levine
Staff: Katie Kopp (Interim)
Current Initiatives
- Neonatal Abstinence Syndrome

Advisory Council

- State-based Agencies and Programs
- Inter-professional and multidisciplinary clinical team members
- Professional Societies
- 3rd Party Payers
- Community Based Organizations
- Patient Advocacy Groups
Building a Collaborative to Last

• Connecting stakeholders
• Aligning efforts
• Working together
GaPQC Hospital Participation

As of 9/1/19

• 62 participating hospitals (80% of birthing hospitals in the state)
  o 44 hospitals implementing AIM Obstetrical Hemorrhage
  o 36 hospitals implementing AIM Severe Hypertension in Pregnancy
  o 47 hospitals implementing the Neonatal Abstinence Syndrome program from the Vermont Oxford Network (VON)

• Percent of GA births impact – 87%
GaPQC Hospital Participation

GaPQC Maternal Initiative Participation

GaPQC Neonatal Initiative Participation
## GaPQC Participating Hospitals

### Distribution by Perinatal Region

<table>
<thead>
<tr>
<th>Perinatal Region</th>
<th># of GaPQC Hospitals</th>
<th>% of Region*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>5</td>
<td>71%</td>
</tr>
<tr>
<td>Atlanta</td>
<td>26</td>
<td>84%</td>
</tr>
<tr>
<td>Augusta</td>
<td>4</td>
<td>67%</td>
</tr>
<tr>
<td>Columbus</td>
<td>9</td>
<td>100%</td>
</tr>
<tr>
<td>Macon</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td>Savannah</td>
<td>7</td>
<td>64%</td>
</tr>
</tbody>
</table>

*Does not include stand-alone birth centers/military facilities
<table>
<thead>
<tr>
<th>Level of Care</th>
<th>% of Birthing Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>78%</td>
</tr>
<tr>
<td>Level II</td>
<td>77%</td>
</tr>
<tr>
<td>Level III (not including RPCs)</td>
<td>88%</td>
</tr>
<tr>
<td>RPC</td>
<td>100%</td>
</tr>
</tbody>
</table>
## GaPQC Participating Hospitals

### Distribution by Birth Volume per year

<table>
<thead>
<tr>
<th>Annual Birth Volume</th>
<th>% of Birthing Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 600</td>
<td>85%</td>
</tr>
<tr>
<td>600 – 1199</td>
<td>82%</td>
</tr>
<tr>
<td>1200 – 2399</td>
<td>71%</td>
</tr>
<tr>
<td>2400 – 3599</td>
<td>91%</td>
</tr>
<tr>
<td>3600+</td>
<td>100%</td>
</tr>
</tbody>
</table>
Rural Hospital Initiative

• 16 rural, Level I and II facilities
  o 16 hospitals implementing AIM Obstetrical Hemorrhage
  o 10 hospitals implementing AIM Severe Hypertension in Pregnancy
  o 14 hospitals implementing the Neonatal Abstinence Syndrome program from the Vermont Oxford Network (VON)
  o 9 are implementing all three initiatives
GaPQC Activities

• Monthly collaborative webinars
• Quarterly data collection/reporting
• Technical assistance calls
• Communications, stealing, sharing
• Training
  o Quality Improvement
  o Drills
  o Implicit Bias
• Annual meeting
• Huge engagement from hospitals, limited by largely volunteer energies
Process Measures for Hemorrhage
GA Collaborative-wide Rate
(April 2018 - June 2019)
Structure Measures for Hemorrhage
GA Collaborative-wide Rate
(April 2018 - June 2019)
Looking Forward

- Many deaths occur after discharge
- Involve additional settings, stakeholders
- Prevention in prenatal and preconception settings
SAVE THE DATE

APRIL 23-24, 2020

Georgia Perinatal Quality Collaborative
3rd Annual Meeting

Atlanta, GA

Agenda and registration information to follow.

For more info: Visit www.georgiapqc.org or email info@georgiapqc.org
Moving Women’s Health Forward

Implemented in Georgia:
• Maternal Mortality Review Committee
• GaPQC and AIM Bundles
• Regional Perinatal Centers
• Levels of Care
• Perinatal Psychiatry Access Program
Maternal Mortality Review Committee (MMRC)

- Robust staff to bring case review current
- Key informant interviews to better understand contributing factors including racial bias
- Robust communication of findings and recommendations
GaPQC

• CDC seed funding through 2022
• Options for sustainability
• Identify new bundles and initiatives to implement
• Expanding efforts to the outpatient and community setting
Perinatal Care System

Regional Perinatal Centers

Maternal and Neonatal Levels of Care
Perinatal Psychiatry Access Program

- Rapid telephone consultation for frontline providers
- Local capacity building through frontline provider training
- Referrals to community supports and local mental health providers
Women’s Health Moving Forward

Opportunities:

• Expanded OB service delivery:
  o Prenatal and Postpartum Telemedicine Program
  o Group Prenatal Care
  o Case Management
  o Family Planning for Women with Chronic Conditions
Shortages of Obstetric Providers & Closed OB Units, Georgia 2018
Increase Local Access to Prenatal Care
Expand Telehealth Network

- Prenatal care in local health departments
- Remote OB supervision
- Local CNM or NP providers
- MOUs with delivery providers
- Remote MFM consultation when indicated
- Increased capacity for local management of higher risk pregnancies
- Increased availability of locally available postpartum care
Group Prenatal Care

• Increase education and social support for pregnant women

• Prenatal care provided in a group setting that includes facilitated discussion and education in three health department locations

• In FY19, $500,000 appropriated to DCH to establish criteria and implement reimbursement for group prenatal care

• DCH pilot in four group prenatal care locations began in February 2019
Case Management

• MMRC recommendation for increased case management during and after pregnancy

• The Pregnancy Medical Home Program and Pregnancy Care Management partnership between the North Carolina Division of Public Health, Medicaid, and Community Care of North Carolina.
Questions?